

Inventors: Sato, et al.
USSN 10/039,309
Attorney Docket No. 56682 (45672)
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Amendments to the Drawings

Please amend the figures by adding new figures 13A and 13B. No new matter is submitted.

REMARKS

In the Office Action dated April 6, 2006, claims 1 and 5-9 are pending and objection is made to claim 4 [*sic*; however, claim 4 appears to be rejected in the body of the office action].

Objection is made to the drawings as not showing every feature specified in the claims, with particular reference to claim 9 ("pair of substrates both include (including) a concave or convex surface on one side thereof that is closer to the liquid crystal layer than the other side thereof"). Applicants herewith submit a new figure illustrating this feature of the claims. No new matter is added because one skilled in the art would understand the structure of the device from the language of the original claim 9, the discussion in the specification, see particularly page 36, lines 1-14, and the original drawings, particularly FIG. 9 (showing a concave or convex surface on one substrate).

Objection to the specification is made because the subject matter of claim 9 has not been disclosed in the remainder of the specification. The specification has been amended to include the subject matter of claim 9. No new matter is added because the description is commensurate with original claim 9, the discussion in the specification, see particularly page 36, lines 1-14, and the original drawings, particularly FIG. 9 (showing a concave or convex surface on one substrate).

Objection is made to claim 9. Applicants have amended claim 9 as kindly suggested by the Examiner.

The above amendment to claim 1 is made to more particularly point out and distinctly claim the subject matter of the present invention. The additional language merely clarifies the structure already set forth in the original claim and does not change the scope of the claim.

Claims 1, 4-6 and 8 are rejected under 35 U.S.C. §102(b) over van den Berk (US 4,356,059). Van den Berk discloses a LCD device having two supporting plates wherein the plates have ridges. The ridges divide each picture element into a number of sub-elements and the edges of each sub-element in the homeotropic-nematic texture [of the liquid crystal composition] is maintained above E_2 if a field strength between E_1 and E_2 prevails at the area of the picture element (col. 2, lines 57-61). Above a threshold value E_{th} of the field strength, the liquid crystal material is light scattering. Above a field strength E_2 , the liquid crystal layer is transparent. As a result of hysteresis, the liquid crystal changes back to light scattering below a field strength E_1 . At a field strength between E_1 and E_2 , the liquid crystal layer is either in the transparent state or in the light-scattering state depending on whether the field strength started from a value higher than E_2 or a value lower than E_1 . (Col. 1, lines 33-52)

Thus, the ridges provided by van den Berk have no effect in providing a LCD device that is capable of performing an intermediate gray level display or a multiple gray level display. In van den Berk, if the field strength for a picture element is above the between the value E_1 and the value E_2 , the ridges held above E_2 prevent the surrounding liquid crystal material from growing into a transparent region. (Col. 5, lines 21-29)

Van den Berk *fails* to teach or suggest that:

in each of the plurality of pixels, a thickness d of the liquid crystal layer has at least two different values, **and the liquid crystal layer includes at least two regions having different values of a first threshold voltage** for transitioning the liquid crystal layer from the planar state to the focal conic state.

Nowhere does van den Berk even suggest that the liquid crystal layer include at least two regions having different values of a first threshold voltage. Van den Berk discloses only one threshold voltage for the entire liquid crystal layer.

Thus, it is not seen how the present invention is anticipated by van den Berk. Further, it is not seen how the present invention would have been obvious to one of ordinary skill in the art in view of van den Berk. Van den Berk does not even discuss or recognize the problems in providing gray scale levels. Certainly, nothing in van den Berk solves such problems, which are solved by the present invention.

The dependent claims are patentable for at least the same reasons as discussed above. Indeed, other features of the dependent claims also are not taught or suggested by van den Berk.

Claim 7 is rejected under 35 U.S.C. §103(a) over van den Berk in view of Scherer (US 5,880,801). Van den Berk is discussed in detail above. Scherer *fails* to make up for the deficiencies in van den Berk. Schere also fails teach or suggest that in each of the plurality of pixels, a thickness d of the liquid crystal layer has at least two different values, **and the liquid crystal layer includes at least two regions having different values of a first threshold voltage** for transitioning the liquid crystal layer from the planar state to the focal conic state.

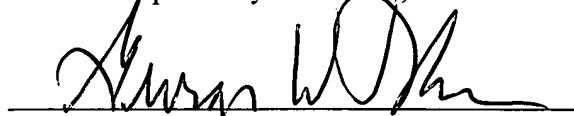
Thus, it is not seen how the present invention would have been obvious to one of ordinary skill in the art in view of any combination of van den Berk and Scherer.

It is respectfully submitted that the present application is in condition for allowance. An early reconsideration and notice of allowance are earnestly solicited.

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If for any reason an additional fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge or to refund Deposit Account No. **04-1105**.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "George W. Neuner", is written over a horizontal line.

George W. Neuner
Reg. No. 26,964

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EDWARDS ANGELL PALMER & DODGE LLP
P.O. Box 55874
Boston, MA 02205
Tel: (617) 439-4444
Customer No.: 21,874